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INVENTORY OF RESEARCH PROJECTS IN THE
PACIFIC NORTHWEST. SUPPLEMENT NUMBER ONE

Federal Water Pollution Control Administration
Portland, Oregon

January 1970

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FEDERAL WATER QUALITY ADMINISTRATION

NORTHWEST REGIONAL OFFICE

PB 218 006

SUPPLEMENT NUMBER ONE

INVENTORY OF RESEARCH PROJECTS
in the
PACIFIC NORTHWEST

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U.S. Department of Commerce
Springfield, VA 22151

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INVENTORY OF RESEARCH PROJECTS

IN THE

PACIFIC NORTHWEST

Supplement Number One

United States Department of the Interior
Federal Water Quality Administration
Northwest Region
501 Pittock Block, Portland, Oregon 97205

January 1970

I

PREFACE

This supplement is the first yearly update of the January 1, 1969 publication, "Inventory of Research Projects in the Pacific Northwest." These publications are designed to facilitate inter-agency communication and to stimulate inquiry into areas of research which need additional emphasis.

The status of all projects in the Northwest Region as of December 31, 1969 is designated as "consummated," "continued," or "new." Work on consummated projects was finished in 1969; a final report may or may not be available. Continued projects are those which were still active on December 31, 1969 and which were funded prior to January 1, 1969. All consummated and continued projects appear in the January 1, 1969 inventory with full abstract information. This supplement lists only titles, names of principal investigators and project numbers of those projects. New projects are those which received initial awards in calendar year 1969, and full abstract information on such projects is given in this supplement.

Mention of commercial products does not imply endorsement by the Federal Water Quality Administration.

Requests for copies of the January 1, 1969 inventory and inventory supplements should be addressed to:

Office of Research and Development, Northwest Region
U. S. Department of the Interior
Federal Water Quality Administration
501 Pittock Block
Portland, Oregon 97205

For details on how to apply for research grants and contracts, write
to the above address or to:

Project Coordination
Office of Research and Development
U. S. Department of the Interior
Federal Water Quality Administration
Washington, D. C. 20242

To obtain information on training grants and research fellowships
and to request application forms, write to:

Division of Manpower and Training
Office of Operations
Training Grants Branch
U. S. Department of the Interior
Federal Water Quality Administration
Washington, D. C. 20242

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RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM DESCRIPTION

Activities of the Federal Water Quality Administration's research, development, and demonstration program are authorized under Sections 5 and 6 of the Federal Water Pollution Control Act, Public Law 84-660, as amended.

Solving the complex problems in pollution control demands a sound base of scientific and engineering knowledge and skilled manpower to apply that knowledge. Progress in water pollution control is being made using existing technology. Future demands on the environment from increased population and the industrial productivity needed to meet future economic goals will require removal of a much greater quantity of pollutants from waste streams. An intensive program of research, development, and demonstration of new and improved technology is needed to meet this requirement for greater effectiveness at minimum cost to the Nation.

Program Objectives

The Federal Water Quality Administration (FWQA), through the Office of Research and Development, is conducting a program of exploratory research of new pollution control methods, the engineering development of these methods to solve the practical problems associated with bringing an "idea" out of the laboratory and into the real world, and the demonstration of this technology to show the decision-makers that new methods are available for use. The program is mission-oriented with each project responding to an identified need for an answer.

Two categories of answers are being sought. First, study is needed in those subject areas where few answers are available today. For example, research on the effects of pollutants and on the prediction of these effects in advance belong to this category. Second, in those subject areas where adequate answers exist today, study is needed to achieve results with maximum effectiveness and at least cost. In those cases where some ability to control pollution exists, new and improved means for control are needed to reduce the cost of pollution abatement. Beyond this, the need to develop and demonstrate means of eliminating that pollution which today is not controlled due to economic or technological constraints is assuming a high priority. As more sources of pollution are brought under control, wastewater quality will be upgraded to the point where treated wastewater will be used routinely to augment our dwindling fresh water supply.

Program Methodology

The initial step in the solution of a water pollution problem is to define the problem clearly by precisely identifying a need. A need is a formal statement consisting of three parts: a description of a particular water quality problem to be solved, a statement of why the solution is needed, and a description of how the solution will be used. Need identification is an ongoing process within FWQA. Persons outside of FWQA who wish to submit needs can do so by obtaining forms and instructions from the Office of Research and Development.

After a need is identified, a series of individual projects, or work plan, which will provide the desired solution is designed by FWQA specialists. These projects are the separate research efforts which will lead to the solution. Work plans are implemented according to priority ratings assigned to the original needs.

To assist in managing the research, development, and demonstration program and in setting priorities and resource allocations, a problem-oriented project categorization is utilized. Eight major subprograms exist, five of which relate to single-source pollution problems and three of which relate to multisource pollution problems:

Specific Source Subprograms

1. Municipal-Pollution Control Technology
2. Industrial-Pollution Control Technology
3. Agricultural-Pollution Control Technology
4. Mining-Pollution Control Technology
5. Other-Sources-of-Pollution Control Technology

Multisource Subprograms

6. Water Quality Control Technology
7. Waste Treatment and Ultimate Disposal Technology
8. Water Quality Requirements Research

Figure 1 lists these subprograms and their individual elements. The 4-digit numbers are used as the lead figures in the identification number ultimately given to each identified need and actual project. As such, they provide a convenient means of categorizing a project. For example, the 1200 series relates to industrial pollution control technology.

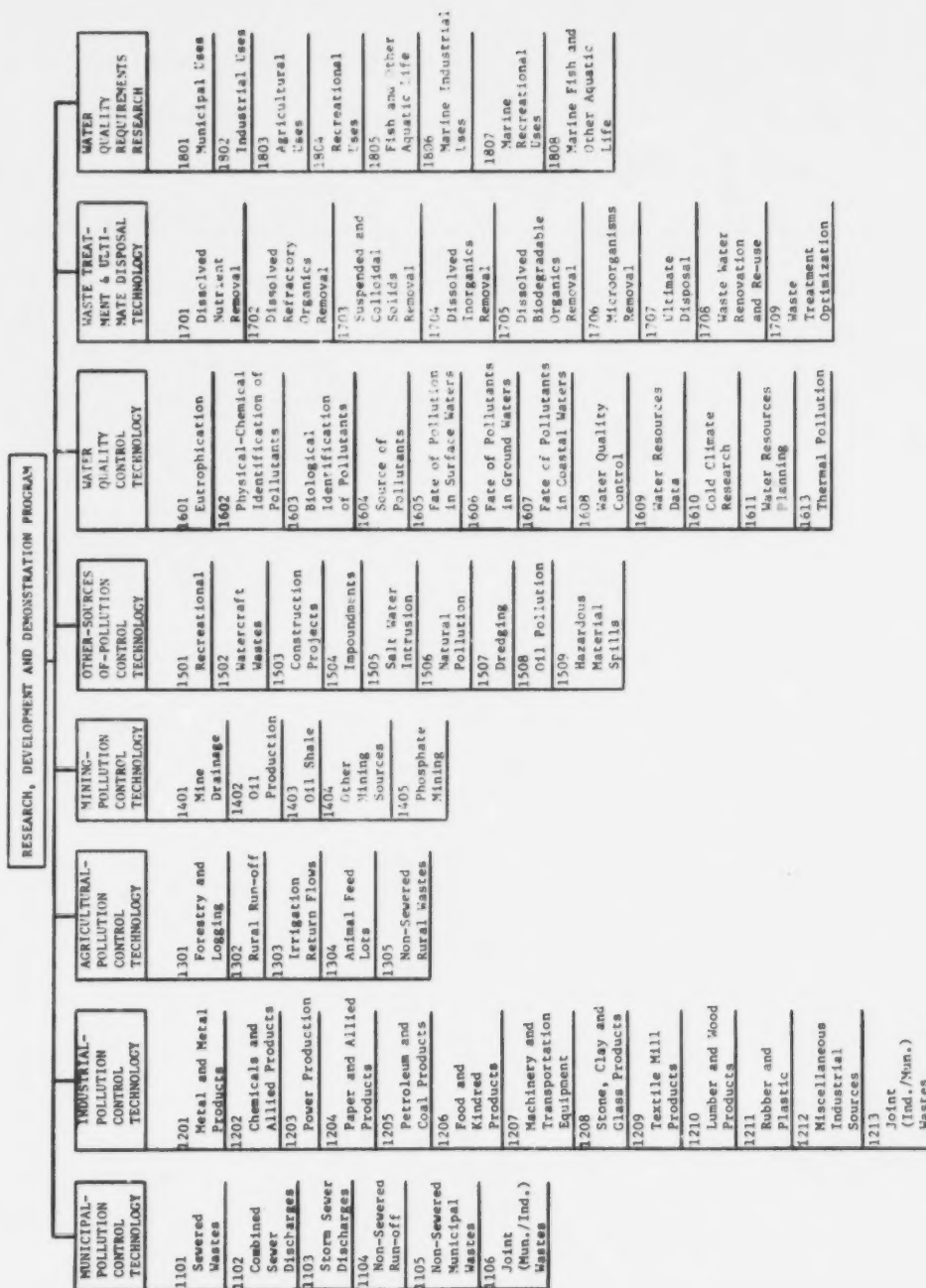
The mechanisms utilized in carrying out the research, development, and demonstration program are:

- (1) Research and development activities within FWQA
- (2) Grant projects with universities, industries, states and municipalities
- (3) Contract projects, primarily with industry

FWQA's in-house activity is the foundation of the overall program. In-house researchers must establish objectives and plans of attack, evaluate the many project proposals received by the Agency, and integrate the results of all research efforts into a usable and applicable form. To do this most effectively, in-house staff must be involved in the work for which they are responsible. In-house research is conducted at eight national FWQA laboratories; each facility functions as a national focal point for research on a given set of problems (as defined by sub-program elements in Figure 1), thus avoiding duplication of facilities, staff and effort. They are located at Cincinnati, Ohio; Athens, Georgia; Ada, Oklahoma; Corvallis, Oregon; College, Alaska; Duluth, Minnesota; Narragansett, Rhode Island; and Edison, New Jersey. Some pilot plant work and certain special studies are carried out at laboratory field stations.

Grant projects require some level of matching support from the grantee. Grants utilize state, municipal, academic or industrial talents and expertise in carrying out research, development, and demonstration efforts.

FIGURE 1



Contract projects are funded entirely with Federal dollars and are utilized primarily for laboratory investigations and pilot-scale research projects which involve a high degree of uncertainty and which are primarily aimed at determination of feasibility and development of design requirements. The work performed under contracts often requires highly specialized personnel, equipment, and facilities. The equipment usually has a high value over a short period of time, but a limited long-term value.

Table 1 presents basic data on the various types of FWOA grants and contracts.

TABLE 1

RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS AND CONTRACTS

<u>Type of Support</u>	<u>Authorization^{1/}</u>	<u>Eligibility</u>				<u>Limitations on Subject Matter</u>	<u>Project Costs Eligible for Support</u>	<u>Other Special Conditions</u>
		<u>Public Agencies & Institutions</u>	<u>Private Organizations</u>	<u>Universities</u>	<u>Individuals</u>			
<u>Grants</u>								
Research-General	5	Yes	Yes	Yes	Yes	No ^{2/}	Less than 100%	None
Demonstration-General	5	Yes	Yes	Yes	Yes	No ^{2/}	Less than 100%	None
Storm and Combined Sewer	6a1	Yes	No.	No	No	Yes	Maximum 75%	State approval required
Advanced Waste Treatment and Joint Treatment	6a2	Yes	No	No	No	Yes	Maximum 75%	State approval required
Industrial Wastes Control	6b	Yes	Yes	Yes	Yes	Yes	Maximum 70%	Maximum grant \$1,000,00
<u>Contracts</u>	5,6	Yes	Yes	Yes	Yes	No ^{2/}	100%	None

^{1/} Sections of the Federal Water Pollution Control Act, Public Law 84-660, as amended.

^{2/} Subject matter must deal with
 Identification of pollutants
 Fate and persistence of pollutants
 Effects of pollutants on water uses
 Treatment processes
 Non-treatment methods of pollution control
 Socio-economic and management aspects of pollution control
 Ultimate disposal of pollutants

PROJECT INFORMATION SUMMARIES

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TABLE 2

RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS
IN THE NORTHWEST

PPBS Number	Other a/ Identification	Project Status in Calendar Year 1969			Page No.
		Consummated	Continued	Awarded	
11020 DSQ	14-12-519			X	39
11020 FDD	14-12-128		X		20
11022 ELK	13-WASH-1		X		20
1102 <u>b/</u>	29-IDA-2	X			15
11060 DKF	WPRD-27		X		20
11060 EZR	WPRD-29		X		20
12040 DBD				X	24
12040 DEH	WP-00628		X		19
12040 DLQ				X	25
12040 EBY	WP-00524		X		17
12040 ELW	WPRD-69		X		21
12040 ESB	WPRD-144		X		21
12040 EXQ	WP-01305		X		19
12040 FZN	WP-01166		X		19
12060 ECF				X	26
12060 EHV	WPRD-15		X		20
12060 FAD	WPRD 58	X			15
1206 <u>b/</u>	WP-01486	X			15
12100 EBG	WP-01320		X		18
12100 EZU	WPRD-174		X		21

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TABLE 2 (Continued)

RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS
IN THE NORTHWEST

PPBS Number	Other Identification	a/ : Project Status in Calendar Year 1969: Consummated : Continued : Awarded	Page No.
13030 DRQ		X	27
13040 DFN	WPR-184	X	14
15080 DJM	14-12-513	X	40
16010 DDS	WP-00422	X	16
16010 DMG	WP-01313	X	15
16010 DUA	14-12-508	X	28
16010 EBB	WP-01389	X	17
16050 DXM	WP-00982	X	19
16060 DGK	WP-01016	X	14
16070 DCD	12-14-481	X	19
16070 DGO	WP-01385	X	17
16070 EKZ		X	29
16070 ENS	WP-01383	X	17
16070 EOK		X	30
16070 FDT	14-12-440	X	17
16080 ERP		X	31
16080 ERQ		X	32
16090 FPZ	WP-01477	X	18
16130 DGM	WP-01450	X	18
16130 EGA	WP-00423	X	17
17010 ECZ	WPRD 26	X	14
17010 ECZ	14-12-579	X	41
17010 EDA		X	42

TABLE 2 (Continued)

RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROJECTS
IN THE NORTHWEST

PPBS Number	:	Other a/ : Identification	:	Project Status in Calendar Year 1969 : Consummated	:	Continued	:	Awarded	:	Page No.
17010 EER		14-12-566						X		43
17010 FJY		14-12-413		X						15
17070 ENP		WPRD-180				X				20
18020 DDM								X		33
18050 DHM		WP-00642		X						14
18050 DIJ								X		34
18050 DJZ		WP-01487				X				18
18050 DLW		WP-01240				X				16
18050 DMB		WP-01278				X				16
18050 DOJ		WP-01525				X				18
18050 DXI		WP-01206				X				19
18050 EBK		WP-01056				X				19
18050 EPZ								X		35
18050 FKT								X		36
18050 FLS		14-12-438				X				16
58		TOTALS		9		31		18		

a/ Contract number or original project number, if applicable.
 b/ PPBS number not assigned.

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TABLE 3

RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS AND CONTRACTS
CONSUMMATED IN CALENDAR YEAR 1969

PROJECT TITLE	PROJECT DIRECTOR AND LOCATION	PPBS NUMBER (Original Grant or Contract Number)
Ammonia Removal from Agricultural Runoff by Selective Ion Exchange	Mr. B. W. Mercer Battelle Northwest Environmental and Radiological Sciences Richland, Washington	17010 ECZ (WPRD-26)
Anaerobic-Aerobic Lagoon Treatment of Manure Wastes	Dr. Donald E. Proctor Washington State University Pullman, Washington	13040 DFN (WPD-184)
Clay Mineral Stability and Water Composition	Dr. J. A. Kittrick Department of Agronomy Washington State University Pullman, Washington	16060 DGK (WP-01016)
Estuarine Ecology Research	Dr. Ernest O. Salo Fisheries Research Institute University of Washington Seattle, Washington	18050 DHM (WP-00642)

TABLE 3 (continued)

RESEARCH, DEVELOPMENT, AND DEMONSTRATION GRANTS AND CONTRACTS
CONSUMMATED IN CALENDAR YEAR 1969

PROJECT TITLE	PROJECT DIRECTOR AND LOCATION	PPBS NUMBER (Original Grant or Contract Number)
Evaluation of Operating Parameters of Alumina Columns for the Select Removal of Phosphorus from Waste- waters and Ultimate Disposal of Phosphorus as Calcium Phosphate	Dr. L. L. Ames Battelle Memorial Institute Pacific Northwest Laboratories Richland, Washington	17010 FJY (14-12-413)
Flushing of Small Shallow Lakes	Dr. John F. Orsborn Washington State University Pullman, Washington	16010 DMG (WP-01313)
Pollution Prevention by Aeration of Fruit Processing Wastes	Mr. Jule Graff Snokist Growers Yakima, Washington	12060 FAD (WPRD-58)
Reduction of Ground Water Infiltration into Sewers by Zone Pumping	City of Meridian Meridian, Idaho	* (29-IDA-2)
Status and Research Needs for Potato Waste Waters	Dr. Dale A. Carlson University of Washington Seattle, Washington	* (WP-01486)

* Project not assigned a PPBS Number.

FEDERAL WATER QUALITY ADMINISTRATION
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TABLE 4

RESEARCH GRANTS AND CONTRACTS CONTINUED IN CALENDAR YEAR 1969

PROJECT DIRECTOR AND LOCATION	PROJECT TITLE	PPBS NUMBER (Original Grant or Contract Number)
UNIVERSITY OF ALASKA College, Alaska		
Dr. Vera A. Dugdale Billaud Institute of Marine Science	Dynamics of the Nitrogen Cycle in Lakes	16010 DDS (WP-00422)
Dr. D. K. Button Institute of Marine Science	Biological Effects of Heavy Metal Pollution	18050 DLW (WP-01240)
UNIVERSITY OF IDAHO Moscow, Idaho		
Dr. Don W. Chapman College of Forestry	Pollution Effects on Adult Steelhead Migration	18050 DMB (WP-01278)
UNIVERSITY OF MONTANA Missoula, Montana		
Dr. Arden R. Gaufin Department of Zoology	Water Quality Requirements of Aquatic Insects	18050 FLS (14-12-438)

TABLE 4 (continued)

RESEARCH GRANTS AND CONTRACTS CONTINUED IN CALENDAR YEAR 1969

PROJECT DIRECTOR AND LOCATION	PROJECT TITLE	PPBS NUMBER (Original Grant or Contract Number)
OREGON STATE UNIVERSITY Corvallis, Oregon		
Dr. Don D. Aufenkamp Department of Mathematics	Mathematical and Computer Services for the Analysis of Data and Design of Experiments for Certain Federal Water Pollution Control Administration Programs	16070 FDT (14-12-440)
Dr. David A. Bella Department of Civil Engineering	Tidal Flats in Estuarine Water Quality Analysis	16070 DGO (WP-01385)
Dr. Fred J. Burgess Department of Civil Engineering	Pulp Mill Effluent Disposal	12040 EBY (WP-00524)
Dr. Fred J. Burgess Department of Civil Engineering	Airphoto Analysis of Ocean Outfall Dispersion	16070 ENS (WP-01383)
Dr. James T. Krygier School of Forestry	Studies on Effects of Watershed Practices on Streams	16130 EGA (WP-00423)
Dr. Robert E. Pacha Department of Microbiology	Sediment-Water Interaction in Eutrophication	16010 EBB (WP-01389)

TABLE 4 (continued)
RESEARCH GRANTS AND CONTRACTS CONTINUED IN CALENDAR YEAR 1969

PROJECT DIRECTOR AND LOCATION	PROJECT TITLE	PPBS NUMBER (Original Grant or Contract Number)
OREGON STATE UNIVERSITY Corvallis, Oregon		
Dr. Frank D. Schaumburg Department of Civil Engineering	Influence of Log Rafting on Water Quality	12100 EBG (WP-01320)
Dr. H. H. Stoevener Department of Agricultural Economics	Economic Benefits from an Improvement in Water Quality	16090 FPZ (WP-01477)
Dr. Charles E. Warren Department of Fisheries and Wildlife	Development of Dissolved Oxygen Criteria for Freshwater Fish	18050 DJZ (WP-01487)
Dr. James R. Welty Department of Mechanical and Industrial Engineering	Thermal Plume Dispersion	16130 DGM (WP-01450)
STATE OF WASHINGTON Olympia, Washington		
Dr. Charles E. Woelke Washington State Department of Fisheries Olympia, Washington	Development of an <u>In Situ</u> Marine Bioassay with Clams	18050 DOJ (WP-01525)

TABLE 4 (continued)

RESEARCH GRANTS AND CONTRACTS CONTINUED IN CALENDAR YEAR 1969

PROJECT DIRECTOR AND LOCATION	PROJECT TITLE	PPBS NUMBER (Original Grant or Contract Number)
UNIVERSITY OF WASHINGTON Seattle, Washington		
Dr. G. Graham Allan College of Forest Resources	Pollution Abatement by Fiber Modification	12040 FZN (WP-01166)
Dr. Joseph L. McCarthy Department of Chemical Engineering	Studies of Low Molecular Weight Lignin Sulfonates	12040 DEH (WP-00628)
Dr. Joseph L. McCarthy Department of Chemical Engineering	Steam Stripping of Kraft Pulp Mill Effluent Streams	12040 EXQ (WP-01305)
Dr. Lynwood S. Smith Fisheries Research Institute	Responses of Fish to Environmental Stress	18050 EBK (WP-01056)
Dr. Frieda B. Taub College of Fisheries	Biological Models of Freshwater Communities	16050 DXM (WP-00982)
SEATTLE UNIVERSITY Seattle, Washington		
Dr. Richard H. Berg Department of Civil Engineering	Study of Oxygen Uptake in the Presence of Varying Degrees of Bottom Sludge Agitation and Various Temperatures and Salinities	16070 DCD (14-12-481)
WESTERN WASHINGTON STATE COLLEGE Bellingham, Washington		
Dr. Maurice A. Dube Department of Biology	Effects of Pollutants on Submarine Plant Synecology	18050 DXI (WP-01206)

FEDERAL WATER QUALITY ADMINISTRATION
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TABLE 5
ENGINEERING DEVELOPMENT GRANTS AND CONTRACTS
CONTINUED IN CALENDAR YEAR 1969

GRANTEE or CONTRACTOR	PROJECT TITLE	PPBS NUMBER (Original Grant or Contract Number)
Cornell, Howland, Hayes and Merryfield Corvallis, Oregon	Primary Treatment of Storm Water Over- flow from Combined Sewers by High Rate, Fine Mesh Screens	11020 FDD (14-12-128)
Municipality of Metropolitan Seattle Seattle, Washington	Duwamish River-Elliott Bay Storm Water Control System	11022 ELK (13-WASH-1)
City of Dallas, Oregon	Complete Aerobic Treatment of Combined Domestic and Industrial Wastes with Mechanical Aeration	11060 EZR (WPRD-29)
City of Tualatin, Oregon	Tertiary Treatment of Combined Domestic- Industrial Wastes	11060 DLF (WPRD-27)
Municipality of Metropolitan Seattle Seattle, Washington	Park Development with Wet Digested Sludge	17070 ENP (WPRD-180)
R. T. French Company Shelley, Idaho	Aerobic Secondary Treatment of Potato Processing Wastes with Mechanical Aeration	12060 EHV (WPRD-15)

TABLE 5 (continued)
ENGINEERING DEVELOPMENT GRANTS AND CONTRACTS
CONTINUED IN CALENDAR YEAR 1969

GRANTEE or CONTRACTOR	PROJECT TITLE	PPBS NUMBER (Original Grant or Contract Number)
Crown Zellerbach Corporation Lebanon, Oregon	Economic Optimization of Secondary Treatment and Determination of Load to Control Biological Growths in a Stream	12040 ELW (WPRD-69)
Klamath Plywood Corporation Klamath Falls, Oregon	Aerobic Secondary Treatment of Plywood Glue Wastes	12100 EZU (WPRD-174)
Crown Zellerbach Corporation Camas, Washington	A Demonstration Plant Evaluation of Four Methods for Pulp and Paper Mill Sludge Utilization and Disposal	12040 ESB (WPRD-144)

SECTION 5 PROJECT AWARDS

Section 5 of the Federal Water Pollution Control Act, as amended, provides grant and contract support for research and development projects relating to the causes, control, and prevention of water pollution.

Research grants and contracts are awarded to public or private agencies, institutions, and to individuals to assist in the conduct of basic and applied research. These awards support projects directed toward the discovery and development of new information and technology in the chemical, physical, biological, and social sciences, in engineering, and in administrative aspects related to water pollution control.

Demonstration grants and contracts support projects which evaluate and apply new information and technology (the products of research and development), and expedite incorporation of new knowledge into routine water pollution control practices. They are awarded to public or private agencies, institutions and individuals.

In the Northwest Region, 12 projects received Section 5 awards in calendar Year 1969. They were distributed as follows:

<u>State</u>	<u>Number of Awards</u>	<u>Amount</u>
Montana	1	\$ 27,324
Oregon	6	222,711
Washington	<u>5</u>	<u>265,594</u>
Total	12	\$515,629

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Title of Project:

Color and Mineral Removal from Kraft Bleach Wastes

Location of Project:

Bozeman, Montana

Grantee:

Montana State University
Bozeman, Montana

Project Number: 12040 DBD

Grant Amount: \$27,324

Project Period:

4/1/69 - 3/31/72

Project Director:

Dr. Robert S. Sanks
Montana State University
Bozeman, Montana

FWQA Project Officer:

Ralph H. Scott
Pacific Northwest Water
Laboratory
Corvallis, Oregon

Summary:

The broad objective of this research is to determine the economic potential of synthetic resins for the control of pollution from kraft bleach wastes, particularly in reuse and recycle systems.

More specifically, the objectives are (1) to explore the use of synthetic resins for the removal of color and other refractory organic contaminants, (2) to optimize the operation of fixed resin beds for the removal of organic contaminants and also for simultaneous demineralization of waste streams intended for reuse and recycle, (3) to seek economical regenerating methods and chemicals and innocuous means of waste regenerant disposal, (4) to compare the relative effectiveness and economy of resins with carbon, and (5) to estimate the cost of waste water renovation, reuse, and recycle using resins either alone or in conjunction with other aids.

Section 5 Grants and Contracts

Title of Project:

Slime Growth Evaluation of Treated
Pulp Mill Wastes

Location of Project:

Lebanon, Oregon

Grantee:

Oregon State University
Corvallis, Oregon

Project Number: 12040 DLO

Grant Amount: \$12,910

Project Period:

3/1/69 - 2/28/71

Project Director:

Dr. Robert E. Pacha
Department of Microbiology
Oregon State University
Corvallis, Oregon

FWQA Project Officer:

Dr. Martin Knittel
Pacific Northwest Water
Laboratory
Corvallis, Oregon

Summary:

The main objective of this research is to evaluate the slime-growth-promoting potential of treated pulp mill wastes. Wastes treated by various means will be tested for their ability to support slime growth using various procedures. Additional studies will be carried out in an effort to define specific carbon and nitrogen sources in treated wastes which support the growth of Sphaerotilus. The effect of environmental factors on growth of Sphaerotilus will be examined. This study will contribute to the development of abatement procedures for controlling slime growth as well as assist in establishing suitable water quality criteria for streams receiving pulp mill wastes. The study also will add to the knowledge on Sphaerotilus.

Section 5 Grants and Contracts

Title of Project:

Water Pollution Abatement in the United States
Seafoods Industry: State of the Art

Location of Project:

Corvallis, Oregon

Grantee:

Department of Food Science
and Technology
Oregon State University
Corvallis, Oregon

Project Number:

12060 ECF

Grant Amount: \$17,695

Project Period:

6/30/69 - 2/28/70

Project Director:

Dr. Michael Soderquist
Department of Food Science
and Technology
Oregon State University
Corvallis, Oregon

FWQA Project Officer:

Kenneth A. Dostal
Pacific Northwest Water
Laboratory
Corvallis, Oregon

Summary:

The objective of this 8-month study will be the development of a State of the Art document on water pollution abatement technology and research for the seafoods processing industry.

Section 5 Grants and Contracts

Title of Project:
Monitoring Herbicide Residues
in Irrigation Systems

Location of Project:
Denver, Colorado
Columbia Basin, Washington

Grantee:
Bureau of Reclamation
Denver, Colorado

Project Number: 13030 DRO
Grant Amount: \$70,000
Project Period:
7/1/69 - 6/30/70

Project Director:
Chief of Engineers
Bureau of Reclamation
Denver, Colorado

FWQA Project Officer:
Tom E. Maloney
Pacific Northwest Water
Laboratory
Corvallis, Oregon

Summary:

The purpose of this cooperative study is to find out how much herbicide gets into irrigation water as a result of routine herbicide applications made on irrigation systems to control aquatic and ditch-bank weeds and to determine herbicide dissipation rate as the treated water moves downstream. The quantity of herbicide found will be valuable information and especially useful in petitions prepared for registration of herbicides for this specific use.

Section 5 Grants and Contracts

Title of Project:

An Investigation of the Release of Phosphorus
from Lake Sediments

Location of Project:

Richland, Washington

Grantee:

Pacific Northwest Laboratories
A Division of Battelle Memorial
Institute
Richland, Washington

Project Number: 16010 DUA

Grant Amount: \$122,100

Project Period:

4/30/69 - 4/30/72

Project Director:

Dr. Jack L. Nelson
Richland, Washington

FWQA Project Officer:

Arnold Gahler
Pacific Northwest Water
Laboratory
Corvallis, Oregon

Summary:

To establish the effects of aquatic environmental factors on the rate of phosphorus release to solution and subsequent availability to algae, investigations will be designed to evaluate (1) the predominant inorganic and organic forms of phosphorus in sediments and suspended particulates of the Upper Klamath and Moses Lakes, and (2) the rate of release of soluble phosphorus from the solid phase with changes in environmental parameters of temperature, pH, and Eh, water, sediment, and particulate composition. Rate of phosphorus release will be related to algal requirements. A statistical design will be employed to evaluate the extent of independent significance and variable interaction. Remedial programs will be suggested on the basis of the fundamental information obtained.

Section 5 Grants and Contracts

Title of Project:

Oxidation of Organic Matter in the Seabed

Location of Project:

Seattle, Washington

Grantee:

University of Washington
Seattle, Washington

Project Number: 16070 EKZ

Grant Amount: \$44,924

Project Period:

6/1/69 - 5/31/70

Project Director:

Dr. Mario M. Pamatmat
Department of Oceanography
University of Washington
Seattle, Washington

FWQA Project Officer:

Dr. D. J. Baumgartner
Pacific Northwest Water
Laboratory
Corvallis, Oregon

Summary:

Objective is quantifying the effects of settling organic matter on oxygen consumption by the seabed (benthic community metabolism, both aerobid and anaerobid) in Puget Sound. Refine measuring techniques and obtain information needed for deciding how much particulate organic matter can be discharged into an estuarine basin under certain conditions without changing the ecosystem so much that multiple use of the water body becomes impossible. Benchmark study of oxygen consumption by the seabed of Puget Sound near Seattle. The Municipality of Metropolitan Seattle opened a central sewage plant at West Point on 5 July 1966 which processes the sewage of most of Metropolitan Seattle (1967 Population 587,000). Digested sludge is currently being discharged at the rate of 100,000 pounds per day, 51 percent of which is volatile solids and 49 percent is fixed solids. After 1971 this plant will be servicing an even greater area. In addition to West Point, four other sewage systems are discharging organic matter into Northern Puget Sound.

Section 5 Grants and Contracts

Title of Project:

Oceanographic Investigations of the Inshore Waters
of the North Pacific

Location of Project:

Corvallis, Oregon

Grantee:

Oregon State University
Corvallis, Oregon

Project Number: 16070 EOK

Grant Amount: \$63,553

Project Period:

7/1/69 - 6/30/70

Project Director:

Dr. William Renfro
Department of Oceanography
Oregon State University
Corvallis, Oregon

FWQA Project Officer:

Dr. R. W. Zeller
Northwest Regional Office
Portland, Oregon

Summary:

The project will be devoted to bringing together all of the available existing oceanographic data (physical and biological) for the nearshore environment from the beach out to approximately ten kilometers off shore along the Pacific Coast from Cape Flattery to Cape Mendocino. Once the data has been collected they will be analyzed in a form that will be useful to personnel at the Pacific Northwest Water Laboratory at Corvallis, Oregon. An interpretive written report will be prepared to accompany the data summary. A detailed study will be made of all available research efforts directed toward the effect and/or control of thermal as well as other forms of pollution in nearshore ocean waters. The culmination of this study will be a state-of-the-art type of report.

Section 5 Grants and Contracts

Title of Project:

Correlated Studies of Vancouver Lake--Hydraulic
Model Study

Location of Project:

Pullman, Washington

Grantee:

Washington State University
Pullman, Washington

Project Number: 16080 ERP

Grant Amount: \$52,376

Project Period:

9/16/69 - 9/15/70

Project Director:

Dr. John F. Orsborn
Washington State University
Pullman, Washington

FWQA Project Officer:

Dr. C. C. Harlin
Robert S. Kerr Water
Research Center
Ada, Oklahoma

Summary:

To develop as complete an analysis as possible of the best methods for introducing "purer" water into Vancouver Lake from the Columbia River so as to establish and maintain higher water quality standards in the lake. The Hydraulic Model Study will develop criteria for future projects of this type and will provide information necessary for the Water Quality Prediction Study described in the accompanying proposal.

Section 5 Grants and Contracts

Title of Project:

Correlated Studies of Vancouver Lake--Water
Quality Prediction Study

Location of Project:

Pullman, Washington

Grantee:

Washington State University
Pullman, Washington

Project Number: 16080 ERO

Grant Amount: \$25,614

Project Period:

9/16/69 - 9/15/70

Project Director:

Dr. Surinder K. Bhagat
Sanitary Engineering Section
Washington State University
Pullman, Washington

FWQA Project Officer

Dr. C. C. Harlin

Robert S. Kerr Research
Center

Ada, Oklahoma

Summary:

Specific Objectives include:

- a. Determination of seasonal variations in water quality in the Columbia River, south of the Vancouver Lake.
- b. Determination of seasonal variations in water quality and sediment composition in the Vancouver Lake.
- c. Based on the data to be acquired in (a) and (b), and the data to be provided by the Hydraulic Model Study being proposed simultaneously, an effort will be made to predict the water quality in the lake should the southern part of the lake be connected with the Columbia River by a new channel.
- d. Outlining the optimum geometry, cross-section and the flow in the new channel as well as its location for maintaining water quality suitable for recreational uses.

Section 5 Grants and Contracts

Title of Project:

Impairment of the Flavor of Fish by
Water Pollutants

Location of Project:

Corvallis, Oregon

Grantee:

Oregon State University
Corvallis, Oregon

Project Number: 18020 DDM

Grant Amount: \$26,240

Project Period:

4/1/69 - 3/31/70

Project Director:

Dean L. Shumway
Department of Fisheries
and Wildlife
Oregon State University
Corvallis, Oregon

FWQA Project Officer:

Dr. Donald A. Hilden
Division of Water Quality
Research
Washington, D. C.

Summary:

To develop, through studies of rainbow trout held in flowing water, appropriate standard methods for the evaluation of the flavor-imparting capacity of freshwater contaminants. The standardization of methods will include selection of specific conditions for exposure of the fish and of methods of organoleptic evaluation of the fish flesh.

To determine through studies using rainbow trout held in flavor-imparting capacity of a substantial number of organic compounds that may be capable of imparting objectionable flavor to the flesh of exposed fish.

Section 5 Grants and Contracts

Title of Project:

Relationship of Temperature to Diseases
of Salmonid Fishes

Location of Project:

Corvallis, Oregon

Grantee:

Department of Microbiology
Oregon State University
Corvallis, Oregon

Project Number: 18050 DIJ

Grant Amount: \$88,375

Project Period:

4/1/69 - 3/31/70

Project Director:

Dr. J. L. Fryer
Department of Microbiology
Oregon State University
Corvallis, Oregon

FWQA Project Officer:

Dr. Gilles LaRoche
National Marine Water
Quality Laboratory
West Kingston, Rhode Island

Summary:

(1) To determine the effect of water temperature upon the course of and mortality from the more important infectious diseases of the salmonid fish native to the Columbia River system and its tributaries.

(2) To determine whether the progress of a particular infection in fish can be arrested at certain periods after initiation of infection by changing the water temperature in which the fish are held to a range which is unfavorable for development of the disease. If it should prove possible to arrest the infection, it will be of interest to determine whether fish recovered from such an aborted infection have developed immunity to reinfection with the disease agent.

(3) To determine the effect of temperature upon the survival of the specific infectious agents of the diseases under investigation in Columbia River water.

Section 5 Grants and Contracts

Title of Project:

Water Resources Scientific Information Center -
Water Quality Requirements and Effect of Water
Pollution on Freshwater and Marine Organisms

Location of Project:

Seattle, Washington

Grantee:

University of Washington
Seattle, Washington

Project Number: 18050 EPZ

Grant Amount: \$20,580

Project Period:

10/1/69 - 9/30/70

Project Director:

Dr. Max Katz
College of Fisheries
University of Washington
Seattle, Washington

FWQA Project Officer

Mrs. Mary Lewis
National Water Quality
Laboratory
Duluth, Minnesota

Summary:

Acquire, select, and abstract from the current world literature, according to the Water Resources Scientific Information Center format standards, pertinent articles on the water quality requirements of freshwater and marine organisms as well as the effects of water pollution on such organisms.

The Principal Investigator has the resources of the Fisheries-Oceanography as well as the other libraries of the University of Washington, besides an extensive personal exchange with leading water quality workers of the world. It is expected that over 500 titles will be collected and abstracted during the first year of the project.

Section 5 Grants and Contracts

Title of Project:

Effects of Logging on Growth of Juvenile
Coho Salmon

Location of Project:

Corvallis, Oregon

Grantee:

Department of Fisheries
and Wildlife
Oregon State University
Corvallis, Oregon

Project Number: 18050 FKT

Grant Amount: \$13,938

Project Period:

11/1/69 - 10/31/70

Project Director:

Dr. James D. Hall
Oregon State University
Corvallis, Oregon

FWQA Project Officer:

Walter H. Preston
Division of Water Quality
Research
Washington, D. C.

Summary:

The principal objective of this project is to determine the impact of temperature increases on the population of salmonid fish that inhabit the small streams affected by logging operations. The goal is to provide information that will assist in setting water quality standards for logging operations that will safeguard the fishery resource while at the same time allowing for orderly timber harvest.

SECTION 6 PROJECT AWARDS

Section 6 of the Federal Water Pollution Control Act, as amended, provides for financial support for research and development projects in three pollution problem areas of storm and combined sewer overflows, advanced waste treatment, and industrial waste pollution control.

Storm and combined sewer awards assist projects which develop or demonstrate new or improved methods of controlling the discharge of untreated or inadequately treated wastewater from sewers carrying storm water and domestic or industrial wastewater.

Advanced waste treatment awards assist projects which develop or demonstrate advanced waste treatment, water purification methods (including methods which provide substantial immediate improvement in existing treatment processes), or new or improved methods of joint treatment systems for municipal and industrial wastes.

Both storm and combined sewer projects and advanced waste treatment projects receive financial support in the form of grants or contracts. Grants are awarded to states and interstate agencies, municipalities and intermunicipal agencies; contracts are awarded to public and private agencies, institutions and individuals.

Industrial waste treatment grants and contracts are awarded to public and private agencies, institutions and to individuals to support research and demonstration projects for the prevention of pollution of waters by industry including, but not limited to, treatment of industrial wastes.

In the Northwest Region, five projects received Section 6 awards in calendar year 1969:

<u>State</u>	<u>Number of Awards</u>	<u>Amount</u>
Washington	5	\$1,132,945

Section 6 Grants and Contracts

Title of Project:

Development, Demonstration and Evaluation
Physical-Chemical Treatment of Combined
Storm-Sanitary Sewage

Location of Project:

Richland, Washington
(and selected field sites)

Grantee:

Pacific Northwest Laboratories
A Division of Battelle Memorial
Institute
Richland, Washington

Project Number: 11020 DSQ

Grant Amount: \$391,310

Project Period:

6/23/69 - 12/23/72

Project Director:

Allen J. Shuckrow
Battelle Memorial Institute
Richland, Washington

FWQA Project Officer:

Danforth G. Bodien
Northwest Regional Office
Portland, Oregon

Summary:

The project is a two and one-half year development, demonstration and evaluation of the applicability, effectiveness and economics of a physical-chemical method of treating combined sewage. The basic process to be demonstrated utilizes powdered activated carbon adsorption, inorganic coagulation, polyelectrolyte flocculation, sedimentation and spent carbon regeneration.

Treatment units and process methodology will be specifically designed to meet the constraints of high and widely fluctuating wastewater volumes, widely varying wastewater quality, short detention times, intermittent use, low first cost and economics of operation, and small construction sites. Beginning with bench-scale design experiments the process will be carried through pilot-scale operations and detailed evaluation of the method.

Section 6 Grants and Contracts

Title of Project:

Investigation of Recovery of Large Marine
Oil Spills by Use of a Vortex Assisted Air
Lift System

Location of Project:

Richland, Washington

Grantee:

Pacific Northwest Laboratories
A Division of Battelle Memorial
Institute
Richland, Washington

Project Number: 15080 DJM

Grant Amount: \$29,840

Project Period:

4/28/69 - 4/28/70

Project Director:

Paul C. Walkup
Richland, Washington

FWQA Project Officer:

James C. Willmann
Northwest Regional Office
Portland, Oregon

Summary:

Delineate an optimum system which utilizes a vortex generator and a high capacity air lift system with an adjustable suction nozzle for pickup of spilled oil from the water surface. Performance of the system will be evaluated by prototype tests under simulated at-sea conditions.

Section 6 Grants and Contracts

Title of Project:

Demonstration of a Mobile Pilot Plant for Ammonia
Removal from Wastewater by Selective Ion Exchange

Location of Project:

Richland, Washington

Grantee:

Pacific Northwest Laboratories
A Division of Battelle Memorial
Institute
Richland, Washington

Project Number: 17010 ECZ

Grant Amount: \$184,600

Project Period:

6/27/69 - 6/27/70

Project Director:

Basil W. Mercer
Richland, Washington

FWQA Project Officer:

R. B. Dean
Advanced Waste Treatment
Laboratory
Cincinnati, Ohio

Summary:

To determine the economic feasibility of ammonia removal by selective ion exchange using sufficiently large-scale equipment for providing dependable cost data. Most of the effort on this project would be for collection of data since the necessary equipment has already been constructed.

Section 6 Grants and Contracts

Title of Project:

Phosphate Removal in an Activated
Sludge Facility

Location of Project:

Seattle, Washington

Grantee:

Municipality of Metropolitan
Seattle (METRO)
Seattle, Washington

Project Number: 17010 EDA

Grant Amount: \$188,567

Project Period:

6/1/69 - 5/31/71

Project Director:

Charles V. Gibbs
METRO
Seattle, Washington

FWQA Project Officer:

Dr. Gary L. O'Neal
Northwest Regional Office
Portland, Oregon

Summary:

The project objective is to determine if phosphates can be removed efficiently and economically in an activated sludge plant using both biological and chemical means. Biological removal will receive prime consideration with chemical removal used on a plant scale only after maximum biological removal is obtained. Computerized statistical analysis of the data obtained will be made to identify pertinent parameters and allow control of the optimum operating conditions for maximum phosphate removal at all times.

Section 6 Grants and Contracts

Title of Project:

Research to Develop and Demonstrate a
Mobile Pilot Plant for Removal of Soluble
Phosphorus from Waste Waters by Adsorption
on Alumina Columns

Location of Project

Richland, Washington

Grantee:

Pacific Northwest Laboratories
A Division of Battelle Memorial
Institute
Richland, Washington

Project Number: 17010 EER

Grant Amount: \$169,314

Project Period:

6/18/69 - 6/18/70

Project Director

Dr. Lloyd Ames
Richland, Washington

FWQA Project Officer:

R. B. Dean
Advanced Waste Treatment
Laboratory
Cincinnati, Ohio

Summary:

The purpose of this investigation is to determine the feasibility of using alumina columns to selectively remove phosphates from wastewater. The research would include the following phases:

- (1) Engineering design of a skid-mounted pilot plant to adsorb phosphates on alumina columns, to regenerate the spent columns, to recover the regenerant and to dispose of the phosphates and other wastes.
- (2) Construction of the Pilot Plant
- (3) Operation of the pilot plant at a local sewage treatment facility and
- (4) Evaluation of the results and preparation of cost estimates for full scale facilities to utilize the process.

PROFESSIONAL TRAINING GRANTS AND RESEARCH FELLOWSHIPS

Professional training grants are authorized under Section 5 of the Federal Water Pollution Control Act, Public Law 84-660, as amended. The purposes of these grants are to encourage cooperation with and assistance to appropriate agencies and institutions in the conduct of training relating to the causes, control and prevention of water pollution.

Professional training grants are awarded to educational institutions to provide for the establishment or expansion of graduate training. Institutions are encouraged to develop specialized and multidisciplinary training for scientists, engineers, and planning personnel. The grants can cover expansion and improvement of academic facilities as well as trainee stipends for students.

A total of eight training grants representing \$349,252 were active at four institutions in the Northwest Region during Fiscal Year 1969.

Research fellowships are authorized under Section 5 of the Federal Water Pollution Control Act, Public Law 84-660, as amended. They are designed to increase the number of scientists and engineers qualified to conduct independent research in water pollution control problems and to assure that an adequate supply of university-level instructors is maintained.

Research fellowships are awarded to individuals for specialized graduate and postgraduate research training in water pollution control. Research fellowships support the intensive training of students in many physical and biological disciplines as well as in fields of engineering.

A total of 12 research fellowships were active at five universities in the Northwest Region during Fiscal Year 1969. An amount of \$27,400 was committed to new fellowships during the fiscal year.

FEDERAL WATER QUALITY ADMINISTRATION
NORTHWEST REGION

TABLE 6
WATER POLLUTION CONTROL TRAINING GRANTS IN THE NORTHWEST
FISCAL YEAR 1969

LOCATION AND PROGRAM DIRECTOR	PROGRAM TITLE	GRANT NUMBER	AMOUNT
Montana State University Bozeman, Montana			
Wright, John C. Department of Environmental Studies	Aquatic Biology and Sanitary Engineering	ITI-WP-228	\$53,055
Oregon State University Corvallis, Oregon			
Burgess, Fred J. Department of Civil Engineering	Graduate Training in Water Quality Engineering	5TI-WP-187	51,371
Curl, Herbert C., Jr. Department of Oceanography	Training in Water Supply and Pollution Control	5TL-WP-111	90,348
Stoevener, Herbert H. Department of Agricultural Economics	Economics of Water Quality and Supply	1TI-WP-217	33,016

TABLE 6 (continued)
 WATER POLLUTION CONTROL TRAINING GRANTS IN THE NORTHWEST
 FISCAL YEAR 1969

LOCATION AND PROGRAM DIRECTOR	PROGRAM TITLE	GRANT NUMBER	AMOUNT
Oregon State University Corvallis, Oregon			
Warren, Charles E. Department of Fisheries and Wildlife	Training in Freshwater and Marine Pollution Biology	5T1-WP-208	\$24,316
University of Washington Seattle, Washington			
Brown, George W., Jr. College of Fisheries	Biological Effects of Water Pollution	5T1-WP-175	36,501
Sylvester, Robert O. Department of Civil Engineering	Training in Water Supply and Pollution Control	5T1-WP-122 3T1-WP-122	40,602 3,274
Washington State University Pullman, Washington			
Proctor, Donald E. Department of Civil Engineering	Training in Water Supply and Pollution Control	5T1-WP-170	18,769

FEDERAL WATER QUALITY ADMINISTRATION
NORTHWEST REGION

TABLE 7
WATER POLLUTION CONTROL RESEARCH FELLOWSHIPS IN THE NORTHWEST
FISCAL YEAR 1969

LOCATION AND RECIPIENT	PROJECT TITLE	GRANT NUMBER	AMOUNT
Montana State University Bozeman, Montana	Primary Productivity in the East Gallatin River, is Relevant to Domestic Sewage	1F1-WP-26, 381-01	\$ 5,100
Bahls, Loren I. Department of Botany and Microbiology			
University of Montana Missoula, Montana			
Morgan, Garth R. Department of Zoology	The Fate of Mineral Nutrients in Flathead Lake, Montana	5F1-WP-26, 212-02	<u>1/</u>
Sonstallie, Lawrence C. Department of Zoology	Effects of DDT Application on Stream Insects	1F2-WP-26, 319-01	<u>1/</u>
Oregon State University Corvallis, Oregon			
Bolen, John J. Department of Oceanography	Marine Radioecology	1F1-WP-26, 321-01	<u>1/</u>

TABLE 7 (continued)
WATER POLLUTION CONTROL RESEARCH FELLOWSHIPS IN THE NORTHWEST
FISCAL YEAR 1969

LOCATION AND RECIPIENT	PROJECT TITLE	GRANT NUMBER	AMOUNT
Oregon State University Corvallis, Oregon			
Broaderius, Steven J. Department of Fisheries and Wildlife	Toxicity of Complex Metal Cyanides to Fish	1F1-WP-26, 364-01	\$ 5,100
Gillespie, Paul A. Department of Microbiology	Sediment-Water-Bacteria Interaction in Eutrophication	5F1-WP-26, 289-02	5,300
Haertel, Lois J. Department of Oceanography	Relationships Between Columbia River Estuary Plankton, Radionuclides and Wood Fibers	5F1-WP-31, 471-02	1/ —
McCain, Bruce B. Department of Microbiology	The Characteristics of a Sockeye Salmon Virus	5T1-WP-26, 157-03	1/ —
Roelofs, Terry D. Department of Fisheries and Wildlife	Parameters of Sublethal Effects of Dieldrin on Fish	1F1-WP-26, 363-03	5,300
Williams, Harvey D. Department of Botany and Plant Pathology	Kraft Pulp Effluent Effects on Algae in Streams	5F1-WP-26, 159-02	1/ —

TABLE 7 (continued)

WATER POLLUTION CONTROL RESEARCH FELLOWSHIPS IN THE NORTHWEST
FISCAL YEAR 1969

LOCATION AND RECIPIENT	PROJECT TITLE	GRANT NUMBER	AMOUNT
University of Washington Seattle, Washington			
Gotelli, David M. Department of Botany	Fungal Parasites of the Phytoplankton	5F1-WP-26, 248-01	<u>1/</u>
Washington State University Pullman, Washington			
Edmundson, Eldon H., Jr. Department of Zoology	Interaction of Three Pollutants on Fish Survival	1F1-WP-26, 371-01	\$6,600

1/ Active in 1969 - Supported by funds awarded in previous years.